Attorney's Docket 200405.00034

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re:	Title:	Symmetrical Multi-Unit Railroad Car
	Inventors:	Mohammed Al-Kaabi and Jamal Hematian
	Assignee:	National Steel Car Limited
	Filed:	June 30, 2003
	Serial No:	10 / 611,659
	Art Unit:	3617
	Examiner:	Mark T. Le

DECLARATION UNDER RULE 1.132

I, Mohammed Al-Kaabi, of 152 Redfern Ave., in the regional municipality of Hamilton-Wentworth, in the Province of Ontario, Canada, make oath or solemnly affirm that I have personal knowledge of the facts to which I hereinafter depose, except for those matters made on the basis of information and belief, and where so stated, I believe the same to be true, and say:

Background

1) I am a Senior Design Engineer at National Steel Car, Limited. National Steel Car is well known in the railroad industry in North America, and has been in the business of designing and manufacturing rail road cars since 1912. The great majority of rail road cars produced by National Steel Car have been designed and manufactured for use in the North American rail road industry.

2) I attended the College of Engineering at the University of Baghdad, in Iraq, and earned a B.A.Sc. in Mechanical Engineering in 1965. I then attended the University of London, England and earned a Ph. D. in Mechanical Engineering in 1976. I have worked as a design Engineer for National Steel Car Limited since 1999.

3) During my employment at National Steel Car I have worked on the design of intermodal well cars, cars for carrying steel coils, and gondola cars.

The Present Application

4) I am one of the inventors of the present application USSN 10 / 611,659, entitled "Symmetrical Multi-Unit Railroad Car", and I have knowledge of the matters shown and described therein. I have reviewed the Office Action of November 23, 2005 pertaining to US patent Application 10/611,659, and have read the commentary made therein with respect to the Ishida, Weber and Pileggi references, US P 5,343,812; US P 3,399,631; and US P 5,207,161, respectively. I have also reviewed the Examiner's Answer of September 15, 2006 to the Appeal Brief filed on July 24, 2006.

5) All of the rejections rely upon the idea that a person skilled in the art of designing rail road cars, having knowledge of the Ishida patent, would be motivated to incorporate the side-bearing arm arrangement of Weber in the cars of Ishida. I have reviewed these references, and I do not see why a designer would be motivated to do this. The Ishida reference does not say anything about freight cars, and does not say anything about side bearing arms. It is not clear to me that the Ishida reference has anything to do with freight cars at all. I have read the Examiner's comments that the Ishida reference could be read as being freight equipment, but I doubt that Ishida had freight cars in mind. In my experience, I do not recall ever having heard of any freight equipment that has employed powered trucks. Although I am not an expert in the design of passenger cars, my only knowledge of rail road cars having powered trucks, other than locomotives, is that they are sometimes used on passenger equipment, such as subway and rapid transit cars. I have never heard of powered trucks on a well car.

6) Again, although I am not an expert in the design of passenger equipment, I would doubt that the articulated connectors and side bearing arms shown and described by Weber would ever be used in passenger equipment, and I am not aware of any instance when equipment of this nature has been used in passenger equipment. For a start, I am not aware that the use of three piece trucks, as shown by Weber, is even permitted in passenger equipment. As far as I am aware, most typically passenger equipment employs H-frame trucks with both primary and secondary suspensions. It would also be customary to expect the use of hydraulic dampers to achieve the much different level of ride quality that would be expected in passenger equipment. For these reasons, I believe that a person skilled in the art of freight car construction would not think that the articulated connectors and side bearing arms of Weber would likely be employed in the cars of Ishida, which seem most likely to be passenger cars.

7) There is nothing in either the Ishida reference or the Weber reference that discusses the dynamic advantages that may be obtained by employing a car having the combination of a symmetrical arrangement of articulated connectors and a symmetrical arrangement of side-bearing arms.

8) According to the Examiner's Answer, it would have been obvious to employ the first of the four embodiments of side bearing arm arrangements of Weber to "control side sways or rolls; and that the use of such symmetrically arranged side-bearing arms in between each pair of the adjacent railcars of Ishida would result in a similar expected benefit, i.e., better side sway or roll controls."

I do not know why anybody reading the Weber patent would decide to use any of Weber's side bearing arms with Ishida's cars. Even if so, I do not see any reason why a designer would be motivated to choose Weber's first embodiment, instead of the others, since Weber doesn't say anything about the first embodiment (of Figures **2** and **3**) having any advantages over the others (of Figures **7** – **9**, **10** – **12**, or **13** – **15**) to obtain the improvement of which the Examiner writes. In fact, it appears to me a designer might more easily have concluded that Weber thought the other embodiments were better because they would not tend to twist the truck bolster about its axis. Second, neither document says anything about abnormally good dynamic performance improvements arising from a symmetrical arrangement, so I do not see why anybody, skilled in the art or not, would make the combination proposed in the rejection.

9) In my view, Weber might be considered an example of the thinking in the industry before our invention. Although tens of thousands of multi-unit articulated rail road cars were built before our invention, there does not seem to have been much, or perhaps any, thought given to dynamic performance in this regard. Although it was known that performance differed depending on whether the 'A' end or the 'B' end was leading, there was no apparent effort made to find a better solution. It seems to have been conventional, or traditional, for perhaps half a century or more to make internal units in multi-unit cars that had a male fitting at one end, and a female fitting at the other. There are three reasons why this may have been. First, this may have been because each car body would then have a flat-based center plate on the bottom of a female articulated connector portion, and so sway sideways less. Second, it may have been that the same design drawings could be used commonly for more units. Third, if a male-female car body unit is damaged, it is easier to remove that single damaged unit and re-connect the remaining units to make a car that is one unit shorter, i.e., if a double ended female unit is damaged, the two adjacent male ends of the remaining units cannot readily be connected together. However it may have been, in this industry once a design becomes relatively common, it may tend to be followed by subsequent designers without necessarily making a new assessment from first principles. For example, when the new symmetrical arrangement was proposed to TTX company, (one of the largest purchasers of railroad cars), the customer was reluctant to consider a non-conventional new design. In my view, this in itself suggests that our design was not obvious at all.

10) The Association of American Railroads (AAR) establishes standards for interchange service in North America. AAR Standard M-1001 Chapter XI: Track Worthiness includes test criteria for truck hunting, constant curving, spiral curving, twist and roll, pitch and bounce, yaw and sway, and dynamic curving. Articulation arrangements in combination with truck characteristics play a key role in the dynamic performance of the articulated cars, particularly the articulated well cars, and may determine whether the M-1001 test criteria are met.

My co-inventor, Dr. Jamal Hematian ran a series of dynamic performance simulations in the context of the M-1001 test methods and criteria using the NUCARS software approved by the AAR. An investigation was carried out on various articulation arrangements to find a robust and reliable design for articulated well cars. A 3-unit articulated well car was used as the base model. The simulation results, as the wheel load percentage, L/V ratios, car body roll angle and side bearing forces were processed and compared for different articulation arrangements. The 3-unit articulated well car of the study consisted of three car body units carried on four trucks. The end-trucks were S-2-C 70 ton SCT trucks, and the intermediate trucks were Barber 125 ton S-2-HD trucks. Stucki constant contact ISB-10 side bearings were used at all locations.

The first simulations assumed an existing car having an asymmetric arrangement of couplers and side bearing arms. In the asymmetric arrangements each internal car body unit had the male part of articulation on one end and the female part on the other end.

There were different options for the side bearing arms:

Option 1: the wide arms go with the male part and the narrow arms go with the female part
Option 2: the wide arms go with the female part and the narrow arms go with the male part
Option 3: the distance between arms on both sides is the same

In the simulations, this design showed a difference in performance depending on whether the 'A' end of the car or the 'B' end of the car was leading. The magnitude of the difference was surprising. For example, the difference of the L/V ratios obtained from the dynamic curve test when either A-end or B-end leading is 5% to 40% for various arrangements and over different speeds. The term L/V refers to the ratio of lateral for to vertical force on a wheel, an axle, or two wheels on the same sideframe, depending on the context.

Dr. Hematian then ran a series of simulations with different variations of symmetrical arrangements. The symmetrical arrangements were of two types: either two male parts of the articulation on both ends of the center unit, or two female parts of the articulation on both ends of the center unit. Different side bearing arm options were again considered. Moreover, sensitivity analyses were also performed on a number of parameters, such as side arms height, longitudinal offset of the side bearings from the center of truck, and side bearing characteristics. The effect of these parameters in combination with various articulation arrangements was evaluated.

After reducing the number of arrangement options, a complete set of track-worthiness test simulations was carried out for one of the new symmetric articulation options under both loaded and empty conditions. The results revealed that one of the most critical tests for this car was the spiral curve test. Therefore, this test was used to re-examine the performance of the car with all different articulations. The simulations revealed that the symmetrical car achieved the same performance in both directions, and that performance was consistently, and significantly, better than the 'bad' end performance of the asymmetric cars. Since the 'bad' end performance was the determinative case, the use of a symmetric arrangement thus resulted in a car with a better overall performance. For example, while the side arm forces for a car with asymmetric articulations on the dynamic curve test are as high as 50000 lbs, while the maximum side arms forces for a car with symmetric articulations in the same tests is only about 12000 to 14000 lbs.

Among all the arrangements reviewed in the dynamic curve and spiral simulations, the symmetric arrangements provided better results, and in particular the one with the female parts of the articulation on the center unit and wide side arms on the opposite side resulted the most stable condition along with a good balance of side bearing forces.

Further, and contrary to the supposition that it is a mere design choice, the width of side arms on the male part of the articulation is an important factor with respect to both the L/V ratios and side arm forces; increasing the width will reduce the L/V ratios about 5% in dynamic curve test and 35% in spiral test (at low speeds), but increases the side arm forces from 12000 to 15000 lbs.

11) Following the numerical analysis discussed above, National Steel Car proposed to sell symmetrical well cars to TTX, as noted above. Although the numerical analysis predicted an improvement in performance, TTX was reluctant to purchase cars having this invention, and was highly sceptical that there would be any advantage. TTX had the first two cars tested. For example, car DTTX 721000 was tested at the TTCI testing facility of the AAR in Pueblo, Colorado. I

attended these tests on July 25 – 28, 2004. The testing confirmed our view that the symmetrical arrangement produces superior overall dynamic performance compared to the previous asymmetric designs. The first order was for 300 cars (i.e., 900 platforms). TTX has since made two follow on orders of 300 and 325 cars requesting the symmetrical arrangement. As far as I am aware, TTX is quite happy with their performance.

In summary, notwithstanding the customer's initial resistance to the product, the cars were built and we observed a marked and beneficial improvement in dynamic performance when the symmetrical arrangements are used. We are not aware of any previous knowledge by others of this design, or of the performance it achieves. It was a surprising, unexpected, and, in our view, beneficial development. Nowhere in the art cited by the Examiner is there anything that identifies any dynamic performance benefit specific to a doubly symmetrical arrangement such as is described above, that we invented, and that we have claimed.

12) And furthermore, I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

M. A. Al-Kaabi

Mohammed Al-Kaabi

Sworn, or solemnly affirmed before me at
600 Kenilworth Avenue, in the City of Hamilton,
In the Province of Ontario, Canada,
this 15th day of November, 2006.

C. Wollaston

Colomba Wollaston,
A commissioner for the Taking of Affidavits

COLOMBA ANNE WOLLASTON, Notary Public,
City of Hamilton, limited to the attestation
of instruments and the taking of affidavits,
for National Steel Car Limited.
Expires April 15, 2007